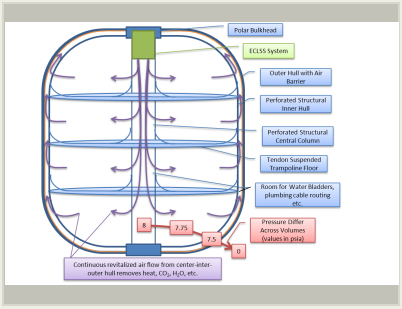
Small Business Innovation Research/Small Business Tech Transfer

Inflatable Habitat with Integrated Primary and Secondary Structure, Phase I

Completed Technology Project (2013 - 2013)

Project Introduction

Paragon Space Development Corp (Paragon) and Thin Red Line Aerospace (TRLA) proposes to explore the utilization of inflatable structures by designing a habitation module as an integrated, all-fabric inflatable structural architecture, rather than modifying rigid space structural designs with an inflatable envelope. Paragon and TRLA have developed several concepts with the potential to eliminate the need for hard-material support structure within an inflated habitat. A key feature of the proposed solution is the focus on eliminating the need to connect to or compromise the air-barrier thus creating a structure with highly predictable load performance and minimal leak rate. The proposed activity will address primary and secondary structures in an integrated fashion with consideration of innovative approaches of addressing the assembly, integration, and deployment of all structures to minimize launch volume and mass while providing cost savings and maximizing usable living space. This includes floors, walls, Environmental Control and Life Support System (ECLSS) elements, thermal control fluid loops, insulation, radiation shielding, MMOF protection, and electrical data support, while providing a stable, secure support for interior hard-goods into an all-inflatable design that can be efficiently packaged. Inflatable structures exhibit the highest specific stiffness of any known structure and can produce significant weight savings over hybrid structural designs. Paragon's multi-pressure vessel concept utilizes nested pressure vessels to form a multiwall structure entirely encapsulated and independent of the outer hull and air barrier material to ensure minimum leak rate. An ECLSS induced pressure differential exists between a central core, the inner habitable volume walls, and the exterior pressure hull and air barrier material. Perforations in the core and inner walls allow continuous airflow providing air revitalization and heat removal.



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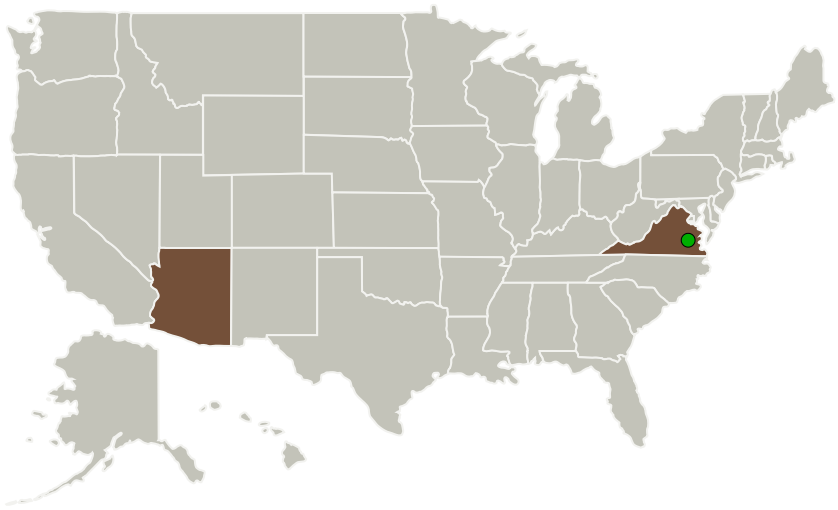
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Paragon Space Development Corporation	Lead Organization	Industry	Tucson, Arizona
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Arizona	Virginia

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138651)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Paragon Space Development Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

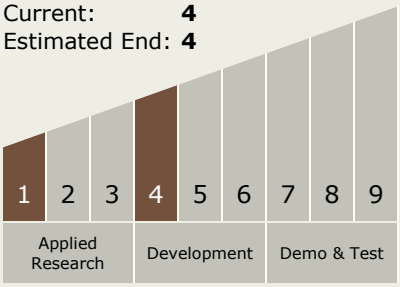
Carlos Torrez

Principal Investigator:

Grant A Anderson

Technology Maturity (TRL)

Start: **1**
Current: **4**
Estimated End: **4**



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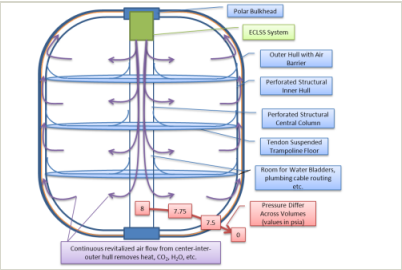
Images



Project Image
Inflatable Habitat with Integrated Primary and Secondary Structure
(https://techport.nasa.gov/image/132923)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.4 Habitation Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System